CLAIMS

What is claimed is:

1. A method of patterning a recording medium comprising:

selectively thermally coupling said recording medium and a heat source to alter a chemical composition of said recording medium.

2. The method according to claim 1, wherein said chemical composition is altered according to a predetermined pattern.

3. The method according to claim 2, wherein said predetermined pattern comprises one of concentric circles and parallel tracks.

4. The method according to claim 1, wherein altering said chemical composition causes an altered magnetic order of said recording medium.

5. The method according to claim 1, wherein altering said chemical composition causes an altered dielectric constant of said recording medium.

6. The method according to claim 5, wherein altering said dielectric constant causes an altered reflectivity of said recording medium.

7. The method according to claim 1, wherein altering said chemical

composition causes an altered electrical conductivity of said recording medium.

8. The method according to claim 7, wherein altering said electrical conductivity causes an altered electron transport property of said recording medium.

9. The method according to claim 1, wherein altering said chemical composition causes an altered thermal conductivity of said recording medium.

10. The method according to claim 1, further comprising:

depositing said recording medium on a substrate.

11. The method according to claim 1, wherein said selectively thermally coupling comprises selectively directing an incident thermal wave from said heat source to said recording medium to form a direct thermal coupling between said heat source and said recording medium.

12. The method according to claim 1, wherein said medium comprises cobalt and chromium.

13. The method according to claim 1, wherein said substrate comprises one of glass, silicon, quartz, sapphire, AlMg and a ceramic substrate.

14. The method according to claim 1, wherein said heat source comprises one of a near-field thermal probe and a nanoheater.

15. The method according to claim 1, wherein said heat source physically contacts said recording medium.

16. The method according to claim 1, wherein said heat source is physically separated from said recording medium.

17. The method according to claim 1, wherein said chemical composition is altered by one of interfacial mixing, interfacial reactions, selective oxidation, structural relaxation, phase segregation and phase change.

18. The method according to claim 1, wherein altering said chemical composition transforms said medium from a paramagnetic medium to a ferromagnetic medium.

19. The method according to claim 1, wherein altering said chemical composition transforms said medium from a ferromagnetic medium to a paramagnetic medium.

20. The method according to claim 1, wherein altering said chemical composition alters a magnetic axis orientation of said medium.

21. The method according to claim 1, wherein altering said chemical composition reduces at least one of magnetization and coercivity of said medium.

22. The method according to claim 1, wherein said selectively thermally coupling comprises selective near-field radiative coupling of blackbody radiation from said heat source to said recording medium.

23. The method according to claim 1, wherein said medium comprises Co_xCr_{1-x}, where x is in a range from 0.63 to 0.75.

24. The method according to claim 1, wherein thermal energy is transferred to said medium by conductive heating.

25. The method according to claim 1, wherein thermal energy is transferred to said medium by radiative heating.

26. An apparatus for patterning a recording medium, comprising:

a heat source for generating and directing an incident thermal wave to a recording medium, said thermal wave altering a chemical composition of a

recording medium; and

a controller for coordinating a mutual position of said incident thermal wave and said recording medium so as to thermally couple said heat source and said recording medium.

27. The apparatus according to claim 26, wherein said heat source comprises:

a heating plate for developing a thermal energy field which couples said heat source to said recording medium; and

a heat sink connected to said heating plate.

28. The apparatus according to claim 27, wherein said heating plate comprises a tip for concentrating and directing a thermal energy.

29. The apparatus according to claim 27, further comprising:

an optical waveguide coupled to said heat sink, for carrying a focused laser beam.

30. The apparatus according to claim 29, wherein said optical waveguide comprises an optical fiber.

31. The apparatus according to claim 29, wherein said optical waveguide comprises a planar optical waveguide.

32. The apparatus according to claim 27, further comprising:

a resistive heating element thermally coupled to said heat sink.

33. The apparatus according to claim 26, wherein said heat source comprises an atomic force microscope probe.

34. The apparatus according to claim 26, wherein said heat source comprises one of a nanoheater and a near-field thermal probe.

35. The apparatus according to claim 26, wherein said controller coordinates said mutual position of said incident thermal wave and said recording medium to induce a direct thermal coupling that subsumes at least one portion of a thermal near-field.

36. A read/write head assembly, comprising:

a read/write head:

a heat source connected to said read/write head for generating and directing an incident thermal wave to a recording medium, said thermal wave altering a chemical composition of a recording medium; and

a controller for coordinating a mutual position of said incident thermal wave and said recording medium so as to thermally couple said heat source and said recording medium.

37. The read/write head assembly according to claim 36, wherein heat source comprises one of a nanoheater and a near field thermal probe.

38. The read/write head assembly according to claim 36, wherein said chemical composition is altered according to a predetermined pattern, and wherein said heat source patterns said recording medium during a read/write operation of said read/write head assembly.

39. A patterned recording medium, comprising:

a substrate; and

a single layer medium formed on said substrate having a portion which has been patterned by altering a chemical composition of said medium using selective thermal coupling.

40. A method for manufacturing a patterned magnetic disk, comprising:

depositing a recording medium on a substrate;

selectively thermally coupling said recording medium and a heat source so as to alter a chemical composition of said recording medium, and

depositing a protective coating on said recording medium.

41. A programmable storage medium tangibly embodying a program of machine-readable instructions executable by a digital processing apparatus to

perform a method for patterning a recording medium. said method comprising:

selectively thermally coupling said recording medium and a heat source to alter a chemical composition of said recording medium.